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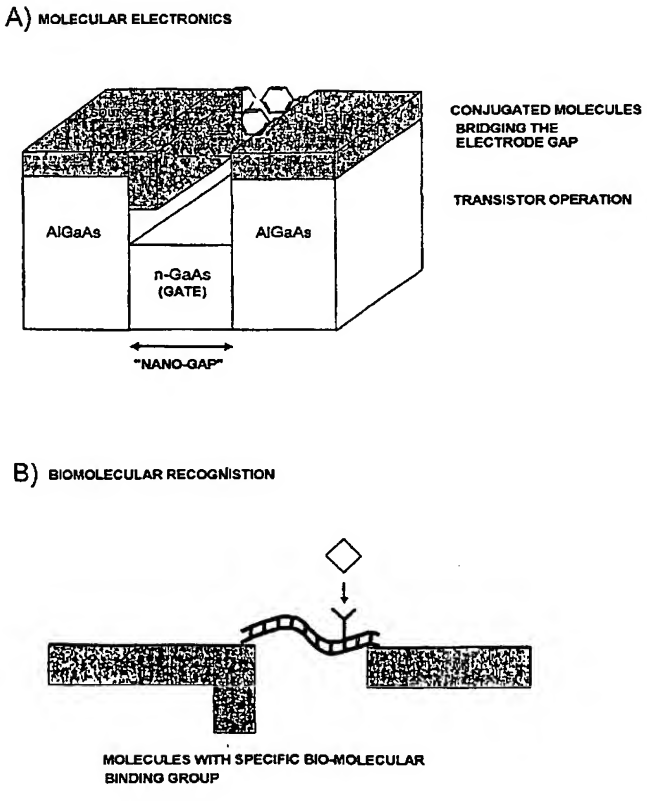
(54) Title: SEMICONDUCTOR BASE STRUCTURE FOR MOLECULAR ELECTRONICS AND MOLECULAR ELECTRONIC-BASED BIOSENSOR DEVICES AND A METHOD FOR PRODUCING SUCH A SEMICONDUCTOR BASE STRUCTURE



(57) Abstract: The invention concerns a structured semiconductor surface as basis for molecular electronics or molecular electronics-based bio-sensors. The starting point is a heterostructure consisting of two undoped layers of a semiconductor material that are separated by an extremely thin (a few nm) layer of a different semiconductor material. This material stack is cleaved perpendicular to the layer planes and the middle layer is selectively etched. Source- and drain contacts for conductive organic "wires" are by built by evaporation with a thin metal film. The middle conductive layer can be employed as electrostatic gate. An assembly for contacting a few up to single wires can be obtained by two sequential separations and evaporations. Possible organic wires are e.g. molecules with conjugated Œ-electron system, DNA-oligonucleotides or carbon nanotubes. By means of a further functionalisation with receptors for biomolecular recognition (antibodies, proteins) an employment as highly sensitive biosensor for detection, analysis and quantification of special biomolecules and their mutual interaction becomes possible (e.g. DNA-protein interaction).

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H01L G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
PAJ, WPI Data, EPO-Internal, COMPENDEX, INSPEC, EMBASE, MEDLINE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KRAHNE R ET AL: "FABRICATION OF NANOSCALE GAPS IN INTEGRATED CIRCUITS" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 81, no. 4, 22 July 2002 (2002-07-22), pages 730-732, XP001130351 ISSN: 0003-6951 the whole document	1-14
P,X	KRAHNE R. ET. AL.: "Nanoparticles and Nanogaps: Controlled positioning and fabrication " PHYSICA E, vol. 17, no. 1-4, April 2003 (2003-04), pages 498-502, XP002272458 page 499-500; figures 1,2	1-14

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[X] Further documents are listed in the continuation of box C.

[ ] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	POSTMA H.W.CH. ET AL.: "Carbon Nanotube Single-Electron Transistors at Room Temperature" SCIENCE MAGAZINE, vol. 293, 6 July 2001 (2001-07-06), pages 76-79, XP002272459 page 76-77	1-14
Y	SINNOTT S.B.: "Chemical functionalization of carbon nanotubes" JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY, vol. 2, no. 2, April 2002 (2002-04), pages 113-123, XP009027193 abstract page 115-116 figures 3-5	1-14